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ATKINS

FUTURE PROOFING CITIES

**Madurai Action Plan : ADB Urban Operational Plan
Session on Inclusive Cities 4th December**

iihs
INDIAN INSTITUTE FOR
HUMAN SETTLEMENTS

Atkins in partnership with

UCL



ATKINS

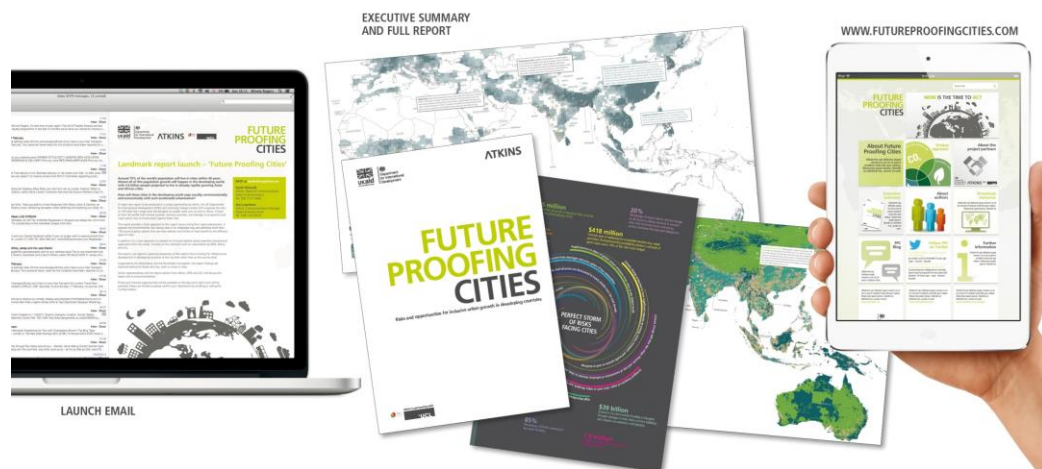
Background: Future Proofing Cities

Developed in 2012 by Atkins in partnership with University College London & UK Department for International Development

Help cities evaluate risks and opportunities and develop investable projects

Uses urban risk database developed from integrated assessment of risks, vulnerabilities & capacity to act

Report looks at 129 cities across Africa and Asia



The risks facing cities: 5 urban types

Assessment of 129 cities:

Possible to group cities into 5 types based on most significant risks they face



Energy intensive, sprawled cities with significant carbon footprints



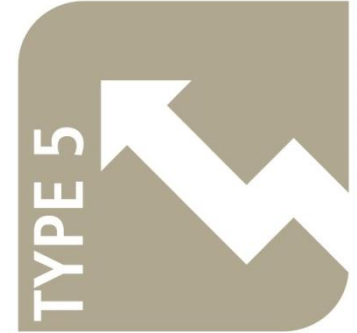
Cities with major climate hazards



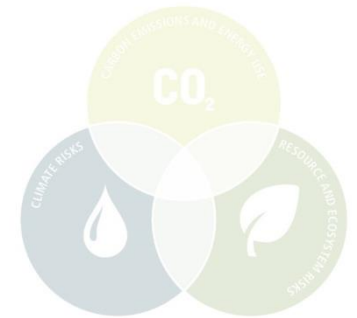
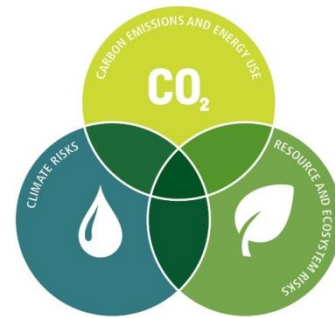
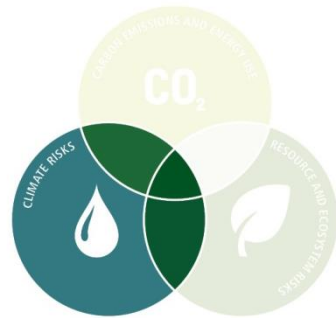
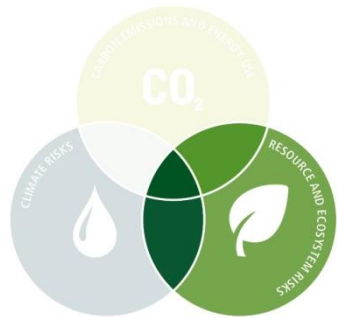
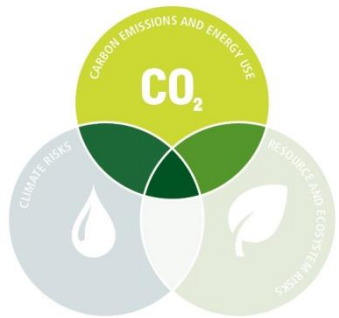
Cities with regional support system(s) at risk (water, food, biodiversity)



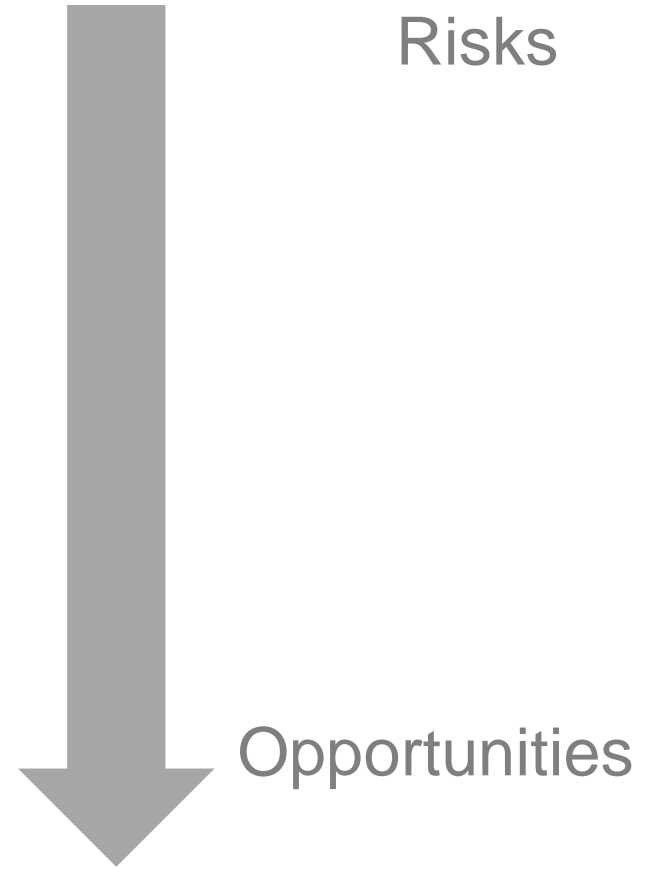
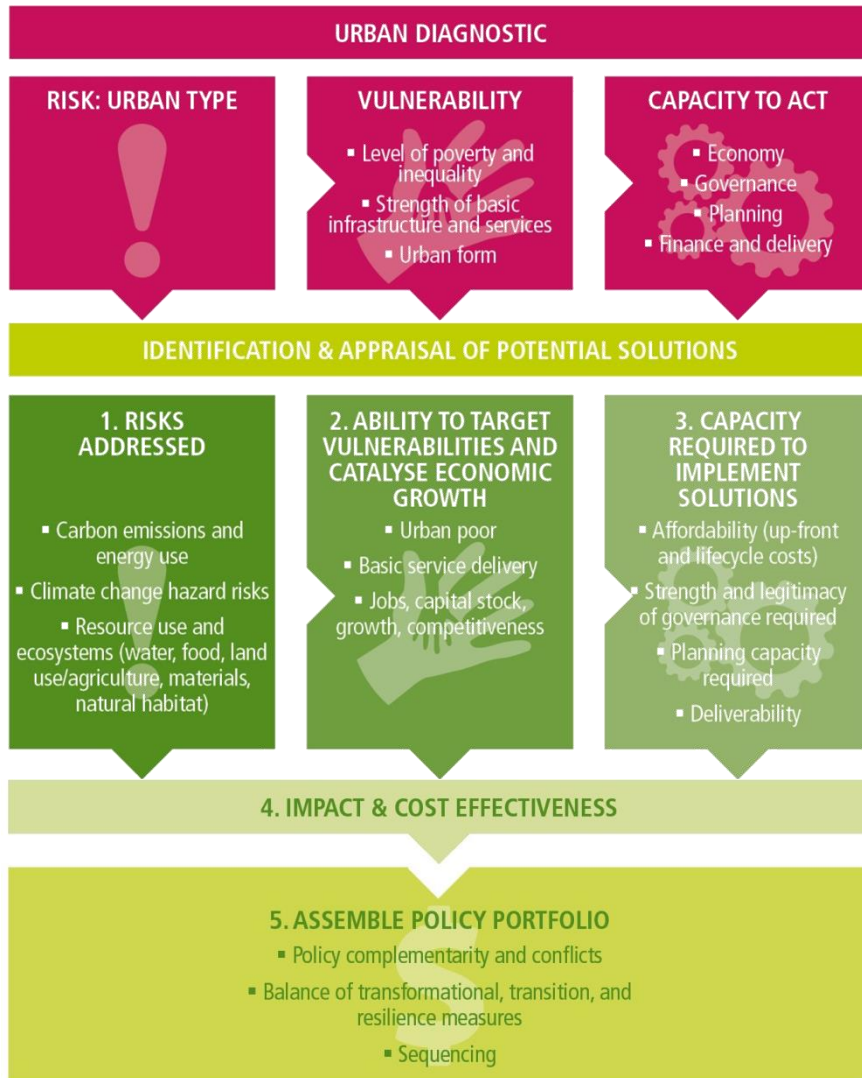
Cities with multiple risks: energy, carbon, climate hazards, and regional support systems



Cities with a low current risk profile

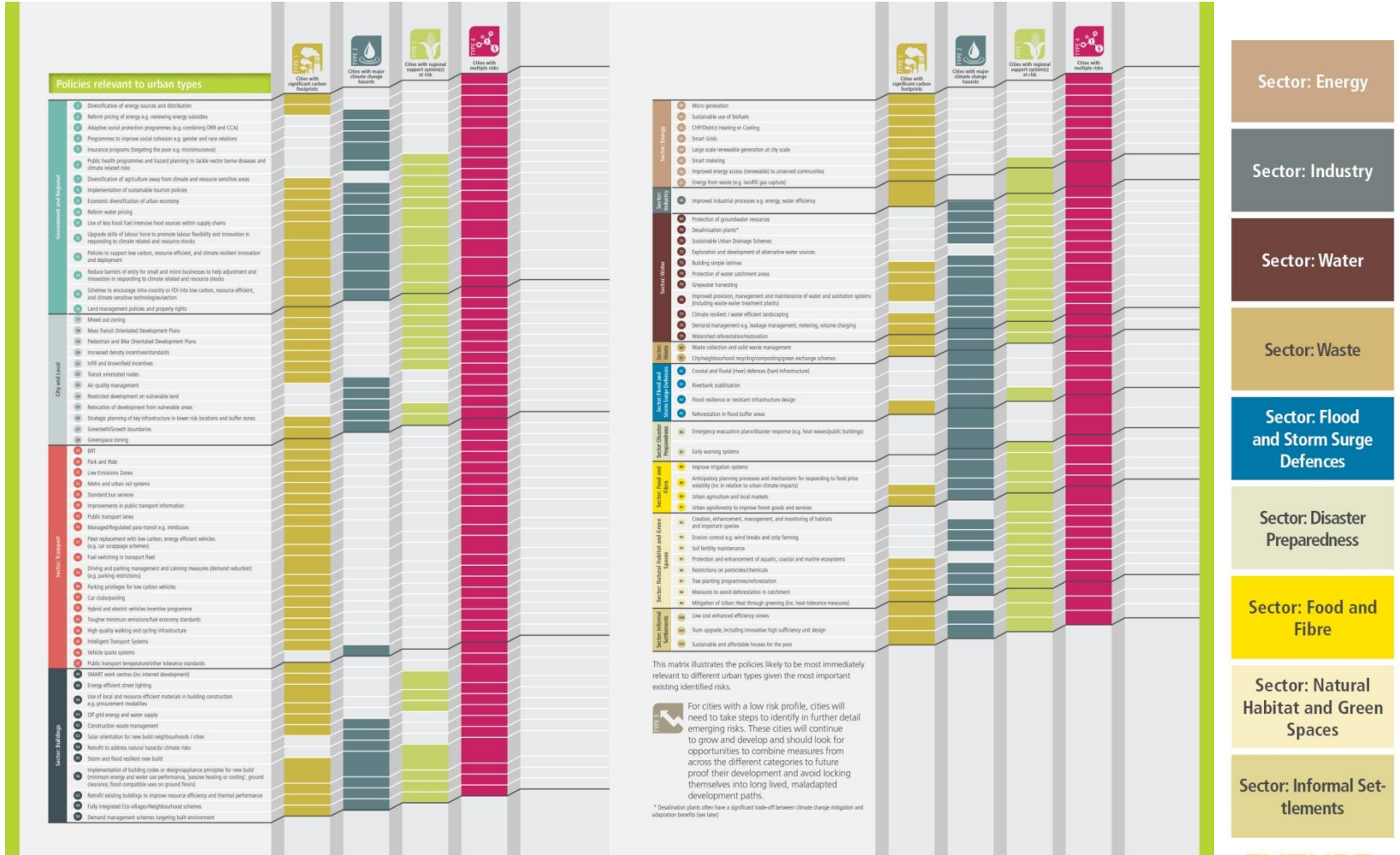


A Summary of a Future Proofing Approach



How Can Cities Future Proof?

Over 100 policies for future proofing



Government and Regional

City and Local

Sector: Transport

Sector: Buildings

- Sector: Energy
- Sector: Industry
- Sector: Water
- Sector: Waste
- Sector: Flood and Storm Surge Defences
- Sector: Disaster Preparedness
- Sector: Food and Fibre
- Sector: Natural Habitat and Green Spaces
- Sector: Informal Settlements

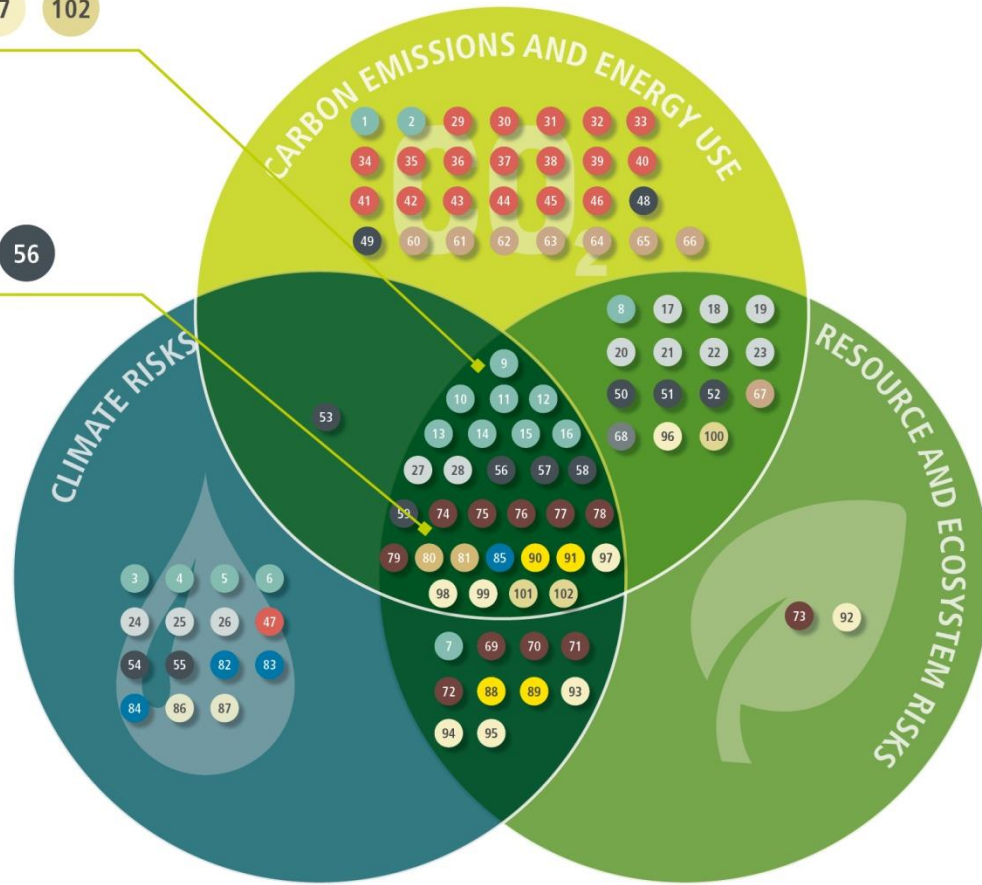
What Works?

Many options produce multiple environmental benefits.....

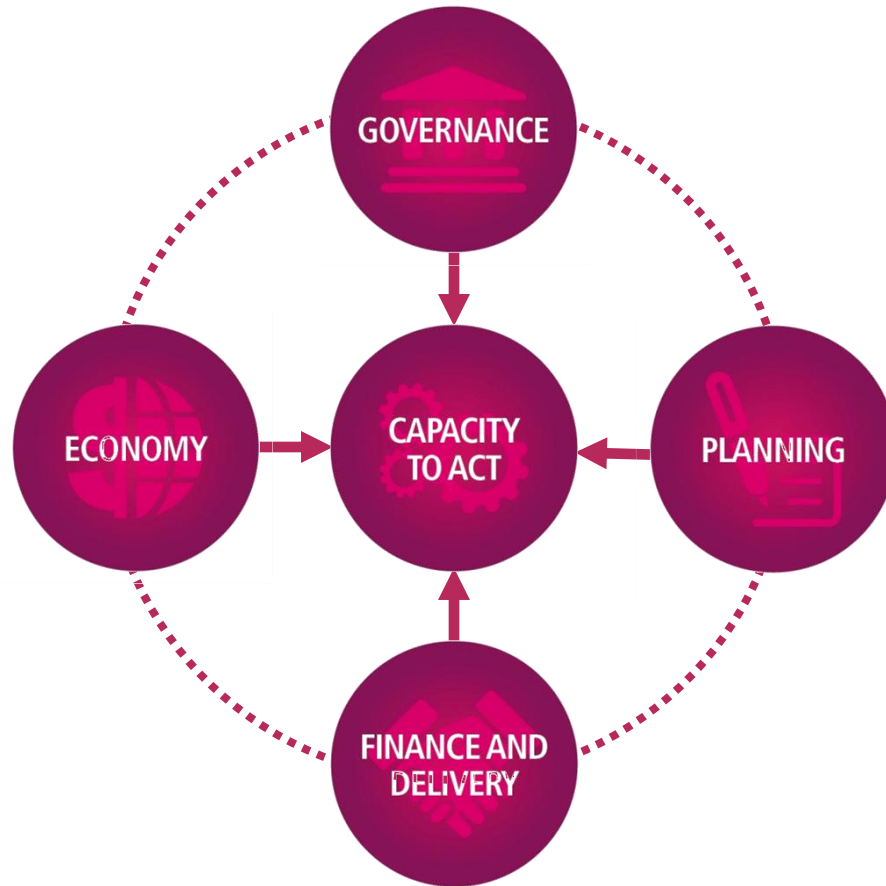
Win-Wins and Triple Win's—
Solutions simultaneously
addressing mitigation
and adaptation: Bangkok



Triple Wins: Future Proofing in the
Built Environment: Bangalore

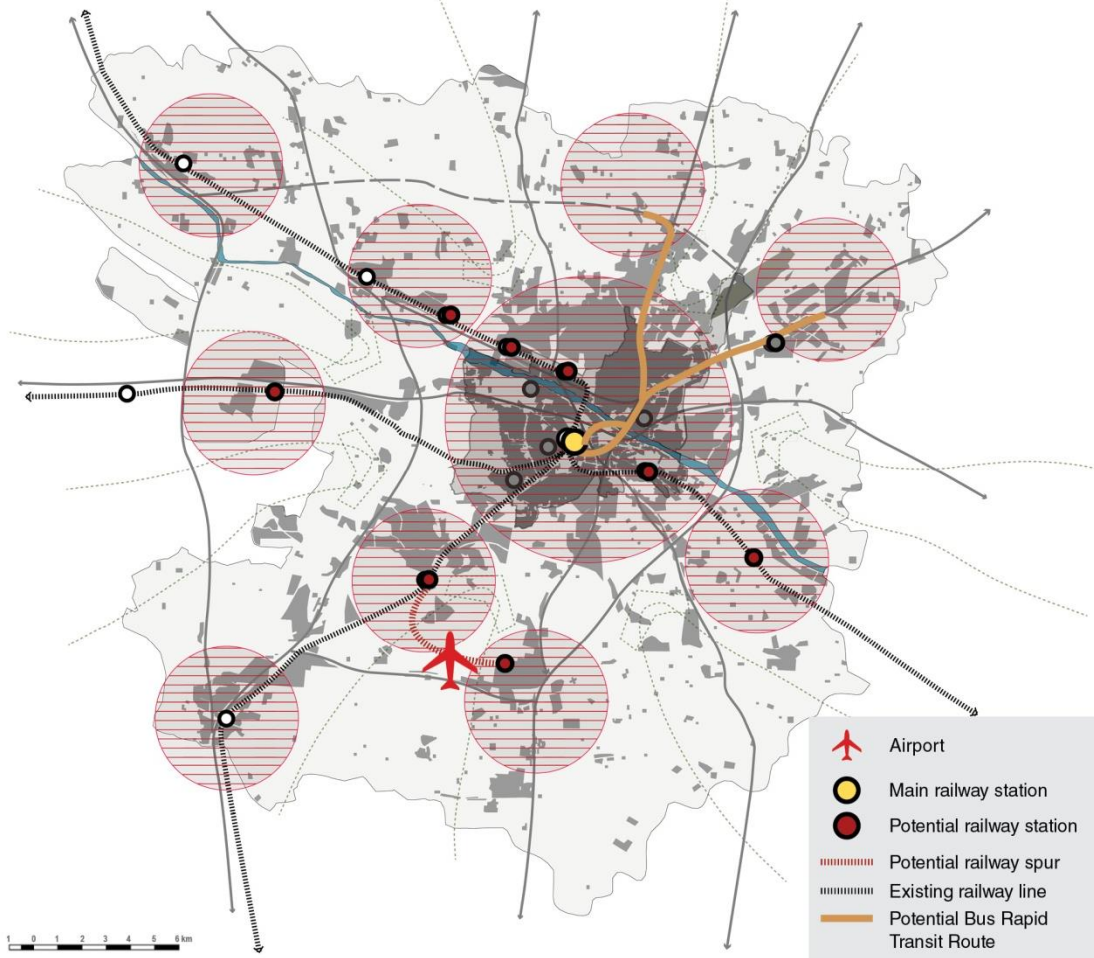


Target Vulnerabilities While Building and Harnessing Capacity to Respond to Risks



And Generate Wider Social and Economic Benefits....

Atkins proposal for Madurai City 2031



- Savings in energy bills: \$1 billion by 2030
- Save 50,000 lives over next 20 years
- Green jobs
- Avoided damage costs of up to \$2.12 billion by 2030
- Green space producing ecosystem services worth \$164 million by 2030

Future Proofing Indian Cities



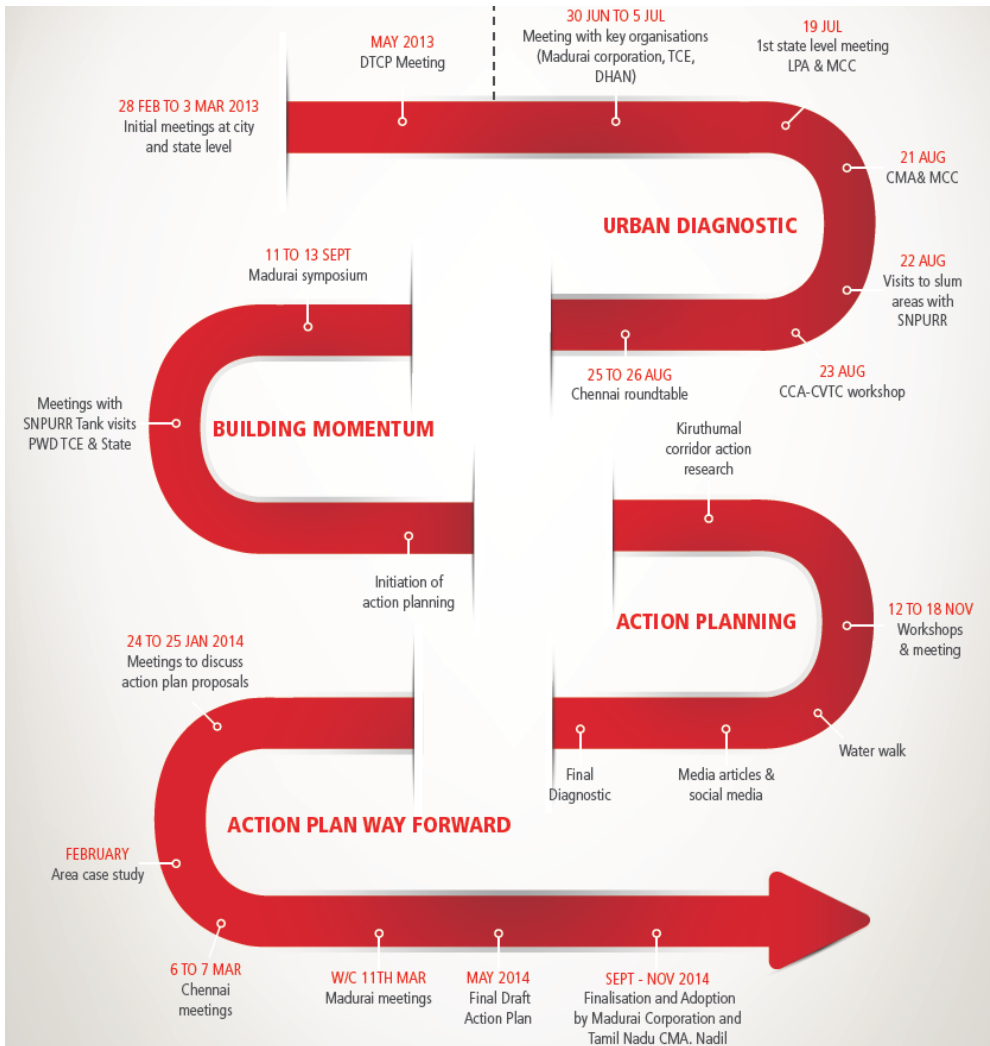
Project Overview

| | ACTIVITIES | STAKEHOLDER ENGAGEMENT | DELIVERABLES |
|--|--|---|--|
| OUTPUT 2: URBAN DIAGNOSTIC | Review of evidence and priorities for future proofing Stakeholder mapping | 1-to-1 discussions around priorities Early identification of 'action groups' Launch workshop to identify 2-3 strategic priority areas Formation of 'action groups' around priority areas | City diagnostic and priorities for future proofing |
| OUTPUT 3: ACTION PLAN FOR FUTURE PROOFING | Identify and appraise long list of policy options for future proofing Develop and assess potential impact of short-list of policy options | Engagement with 'action groups' to define and short-list options Meetings with key decision-makers | City action plans |

Action Plan Purpose

- **Address identified risks**, including multiple climate risks to generate ‘win-win’ and ‘triple win’ environmental benefits
- **Mobilise action**, target specific vulnerabilities and deliver change on the ground that will benefit a wide range of stakeholders, including those in multidimensional poverty
- **Define a programme of integrated action** to help unlock currently stalled projects in Madurai and address the future needs
- **Make the case for the mobilising resources** to address issues and infrastructure gaps in Madurai
- **Input to CDP** - Results contribute to the forthcoming revision to the CDP and masterplan
- **Be implementable**, in the context of other existing plans, capacities and incentives

Future Proofing Madurai - Action Planning



What will the Madurai climate be like in 2030?

Key Climate risks

Temperature trends

Variability in monsoon rainfall

Extreme precipitation events

Impacts on different sectors

Agriculture

Natural Ecosystems and Biodiversity

Water resources

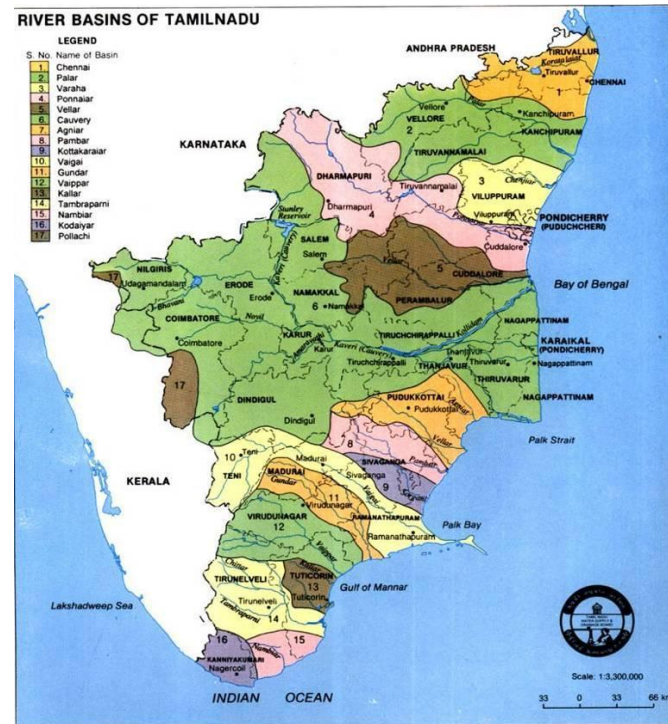
Human health

Buildings

Roads

Flooding

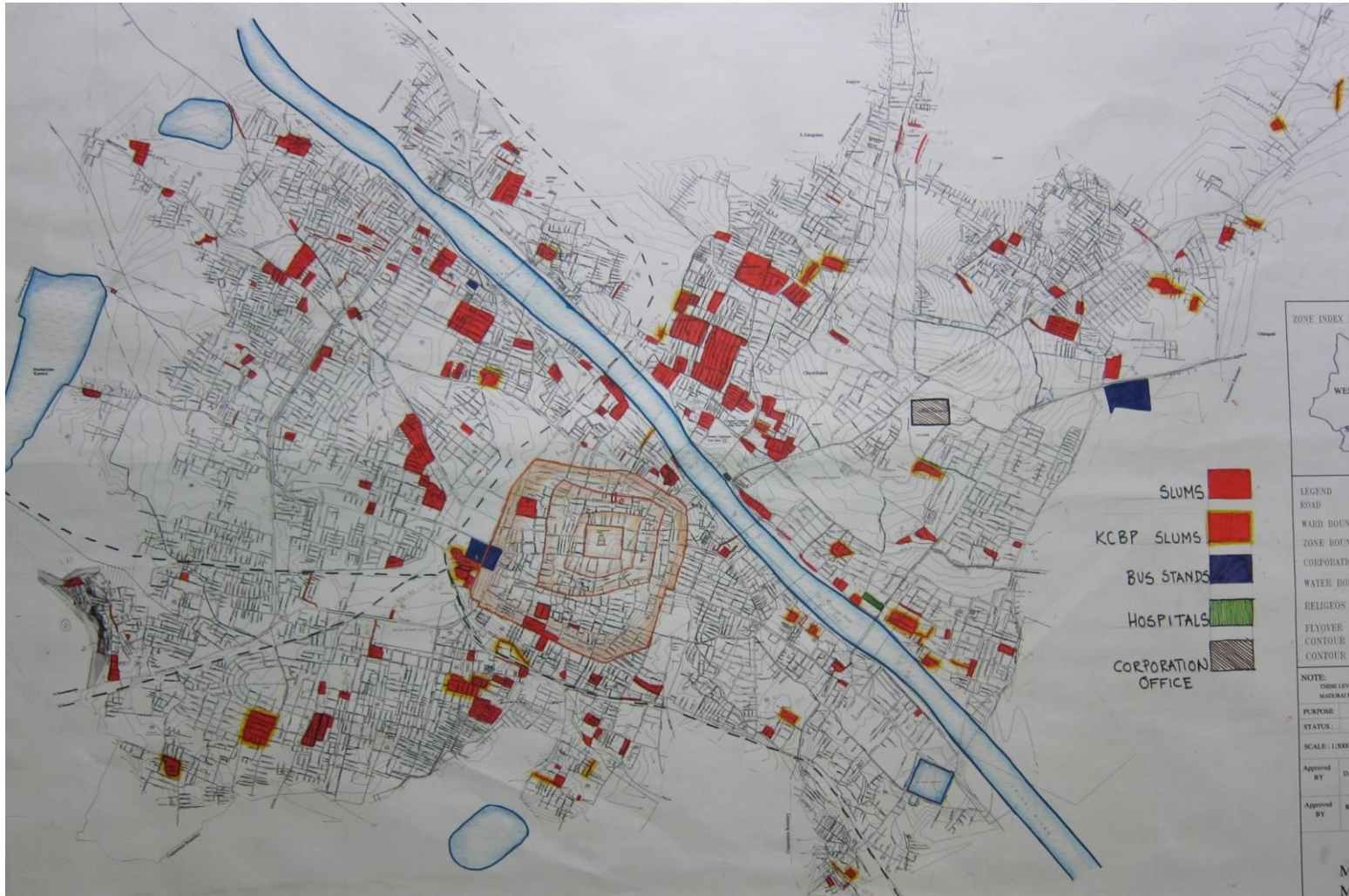
Water balance in the Vaigai Catchment and water supply infrastructure



Agriculture sector under pressure from urbanisation and climate change



Slum areas are often most vulnerable



MADURAI CORPORATION WARD MAP

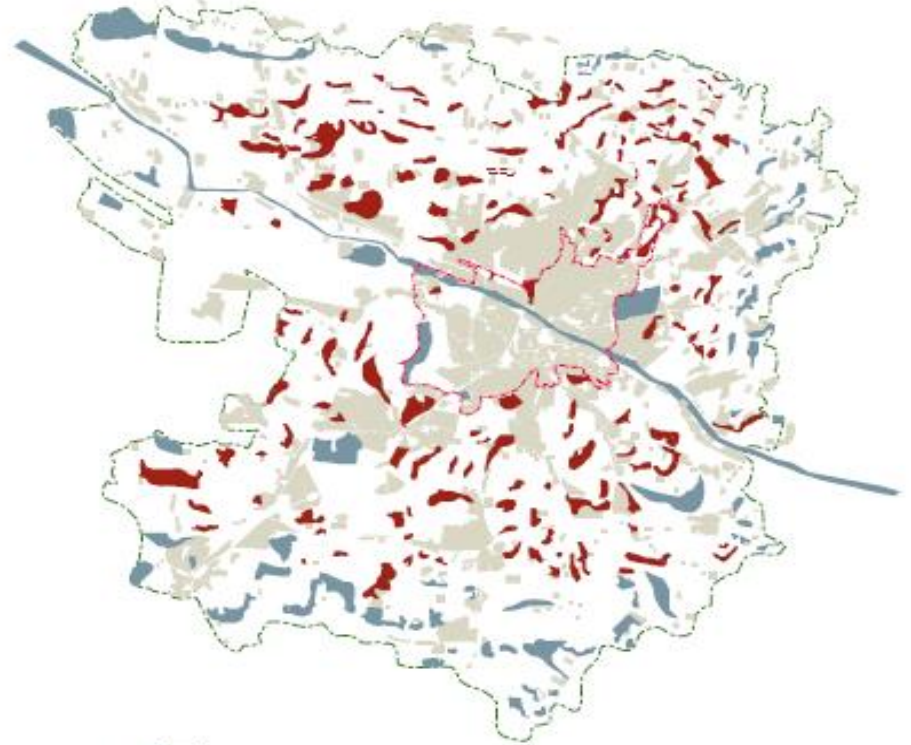


Corporation boundary recently extended
but does not include LPA area

Urbanisation in peri-urban areas is leading to further pressures



Urbanisation has impacted on natural protection from flooding and traditional water systems



- Existing development
- Water body without water
- Water body with water
- LPA boundary
- Corporation boundary

Encroachment on Tanks and Nallas



Falling into disuse due to changes in hydrology and Vaigai sand mining



Loss of tank to development - Periyar Bus stand



Most of the functioning tanks are polluted



Wastewater flows into tanks from areas with no sewerage infrastructure

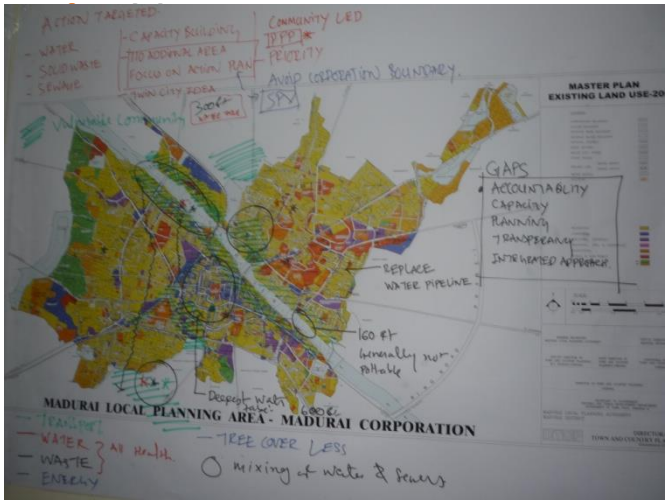
Impacting quality of life – increasing vulnerability



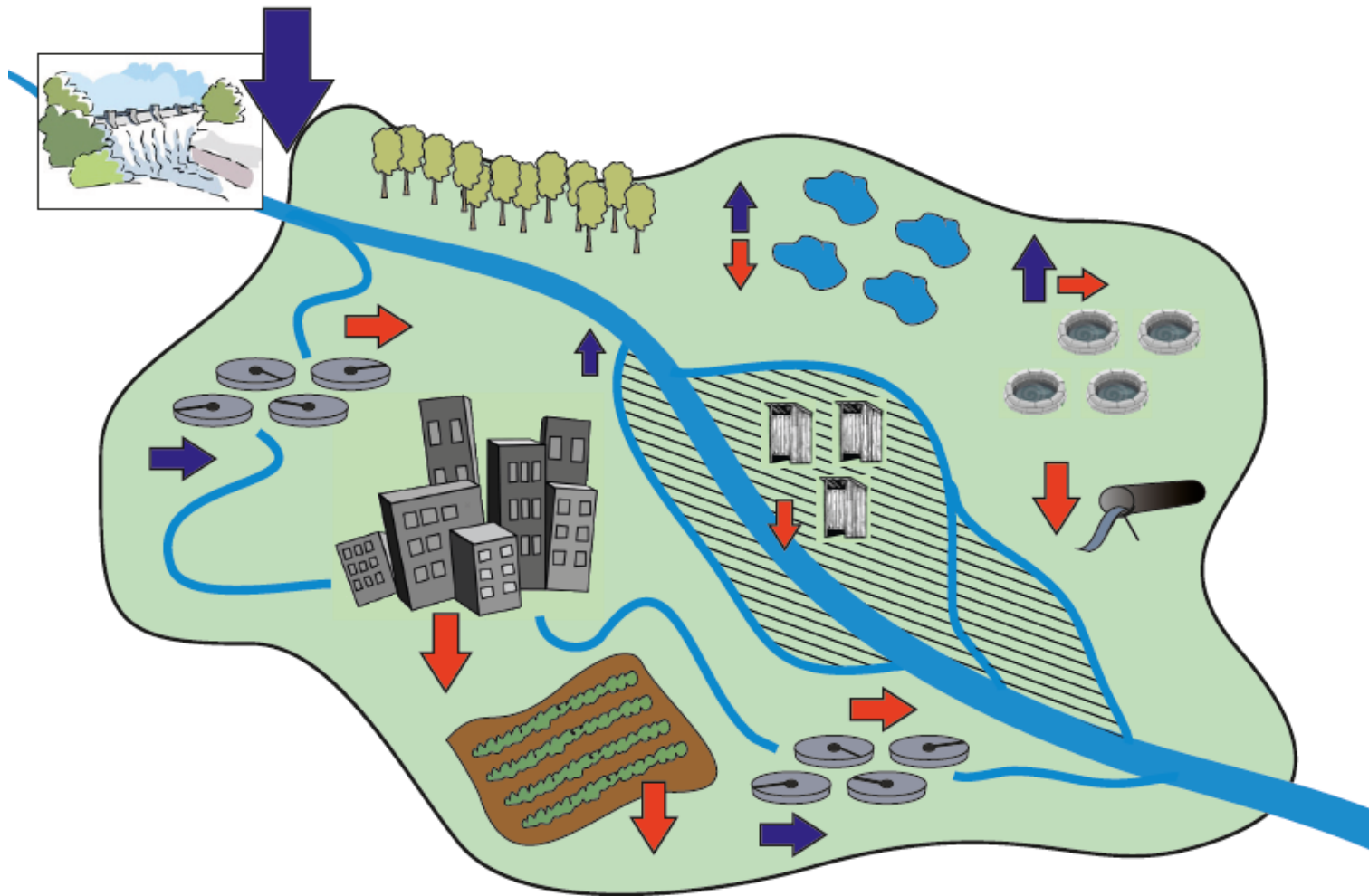
Programme of city visits to help identify priority areas for action



Multi stakeholder workshops and meetings



Priorities focused around blue – green networks



The Strategy – 14 Interlinked projects

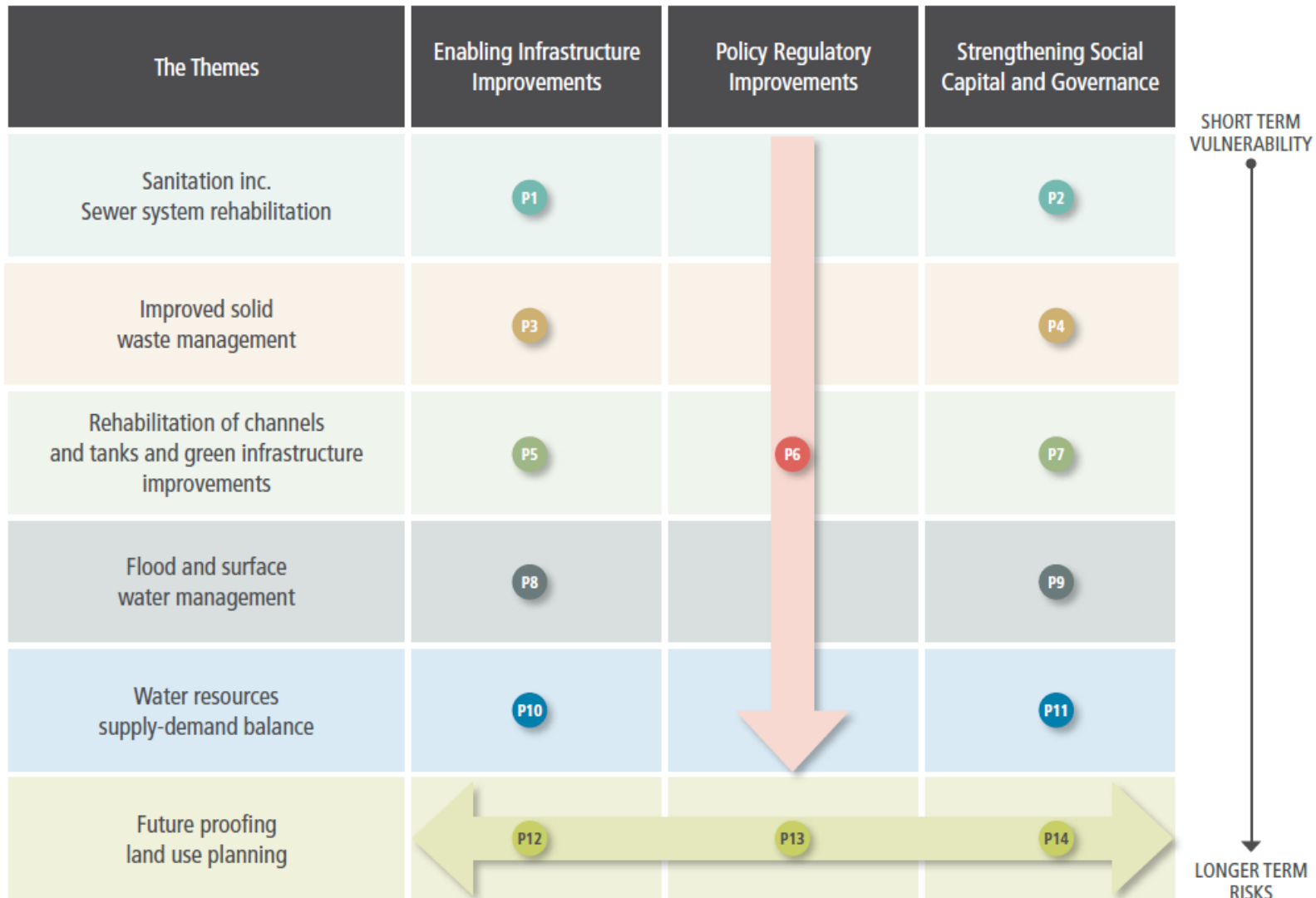
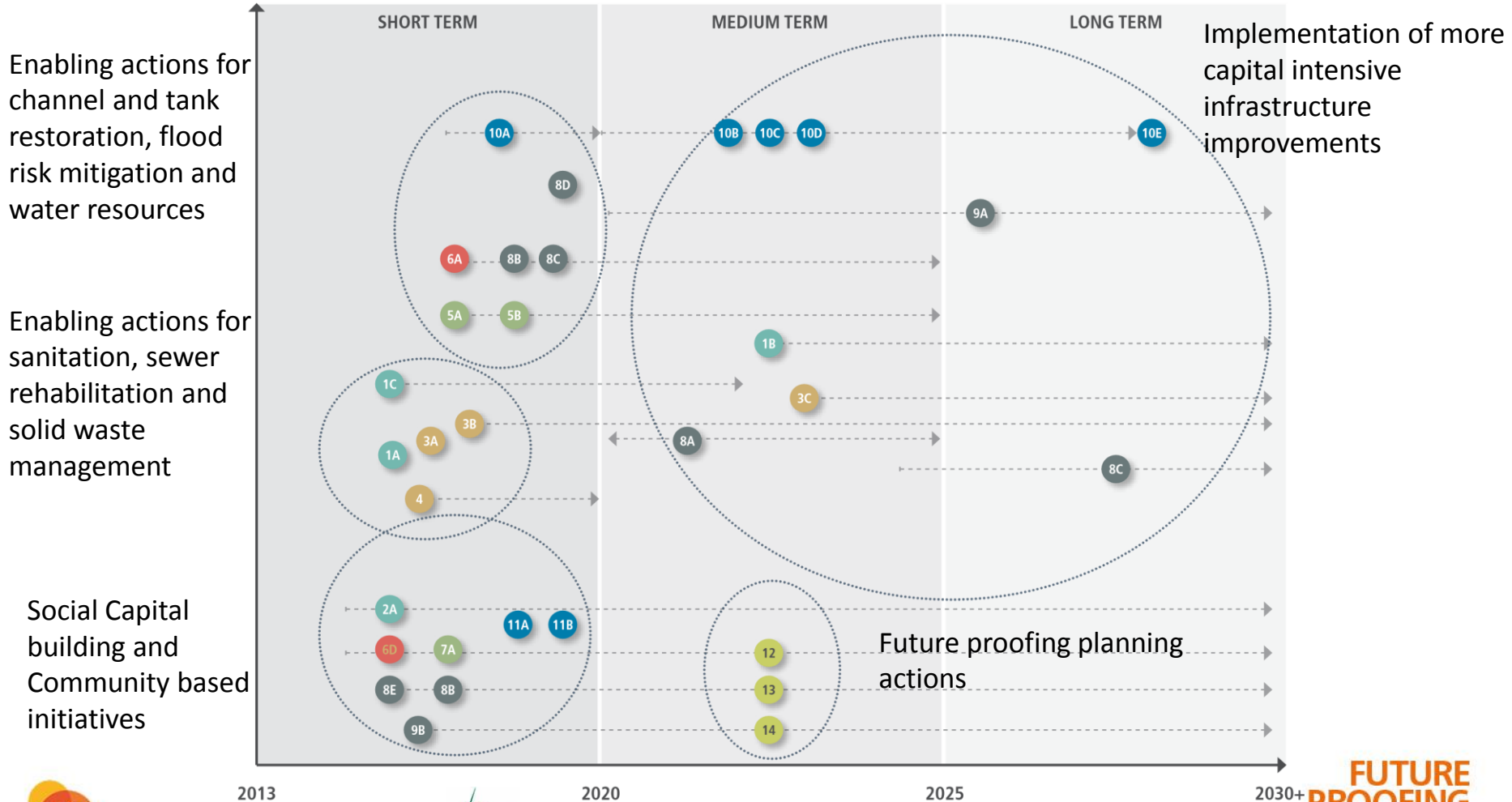


Figure 4 – Tackling risk and vulnerability together in Madurai

Action Plan Projects

1. Sewer system rehabilitation
2. Sanitation community capacity building
3. Improved solid waste infrastructure
4. Solid waste management community capacity building
5. Channel and tank restoration
6. Channel and tank protection and management
7. Channel and tank community involvement
8. Flood and surface water drainage improvements
9. Flood and surface - community capacity building
10. Water resources infrastructure improvements
11. Water resources capacity building
12. Blue Green Infrastructure Co-ordination
13. Green City Plan linking to the revised Masterplan/CDP
14. Platform for community participation to help develop and deliver the plans

Sequence of Actions



P11 Project 11: Water resources capacity building

RATIONALE:

Outcome: Greater involvement of the community in managing water resources and understanding the importance of water resources protection and good hygiene.

Proposal: This will involve three sub components (A) Water safety planning (B) Rain water harvesting (C) Education on water sources and hygiene.

Issues addressed: Water resource deficits; health risks.

KEY ACTIONS:

- Develop a Water Safety Plan
- Scale up rainwater harvesting
- Provide education on water sources and hygiene



Figure 27 – Many slum areas are built on land along rail and rover corridors and experience multiple vulnerabilities. Water is drawn from channels which are polluted by raw sewage.

P1 Project 01: Sewer system rehabilitation

RATIONALE:

Outcome: The sewer system is a contained system, collecting all sewer waste and delivering it to the treatment works without contamination of the environment. Future capacity and related infrastructure constraints are understood and considered as part of rehabilitation works; this will also consider the implications of climate change e.g. on capacity.

Proposal: Three sub components are required: a study to better understand the current infrastructure condition and to identify future capacity requirements; completion of the sewer infrastructure; building of improved toilets to avoid water pollution and to minimise health risks.

Issues addressed: Pollution of watercourses including River Vaigai; health risks; under-utilisation of treatment works and outputs.

KEY ACTIONS:

- Better understand the current infrastructure condition and future capacity requirements and constraints through mapping and analysis
- Complete the sewer infrastructure
- Build community toilets to serve slum communities and ensure these are resilient and serviced



RATIONALE:

Outcome: The channels and tanks are restored to in order to function more naturally, thus providing a number of supporting services to the city.

Proposal: This project contains two sub components. Firstly, a mapping exercise will be undertaken to provide a common understanding of the interaction of the channels and tanks. Secondly, a programme of restoration will be designed and implemented in order to maximise the supporting services.

Issues addressed: Pollution of watercourses; water resource deficits; groundwater recharge; flood risk; health risks; opportunities for local agriculture; under-utilisation of treatment works; provision of high quality open green space.

KEY ACTIONS:

- map and document a common understanding of the operation of the tanks and channels
- restore the tanks and channels, taking into account operational practice and climate change impacts



Figure 23 – Many of the water bodies which could play a role in providing water for the city are polluted from untreated sewage and pollutants from dumping.

RATIONALE:

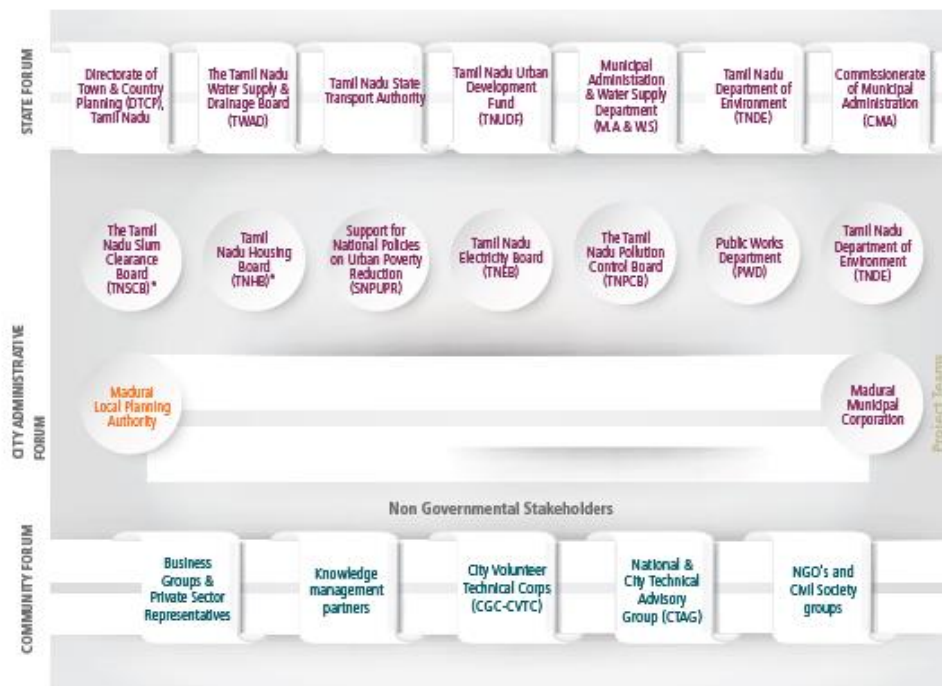
Outcome: Structures enabling co-ordination of relevant stake holders that with interests in providing, managing and utilising green-blue infrastructure at a state, city and local level.

Proposal: The creation of a integrated co-ordination framework with an appropriate process to facilitate informed and joined decision making and governance to support implementation.

Issues addressed: The lack of coordination between individual departments and institutions; gaps in management and implementation to support delivery.

KEY ACTIONS:

- Establishment and enablement of agreed City Partnership co-ordination structures.
- Refinement and formalisation of City Partnership body and decision frameworks.
- Workplan for the City Partnership body prepared
- Formation of Madurai City Corporation Project Teams
- Strengthen project and programme management systems and procedures including appointment of a city co-ordinator.
- Establishment of Knowledge Management and project preparation partnership.
- Define technical assistance and capacity building activities to strengthen governance and institutions.
- Develop a resourcing and funding strategy.
- Infrastructure standards and co-ordination procedures to enable effective infrastructure delivery.



Project 13: Green City Plan Linking to the City Development Plan and Masterplan

RATIONALE:

Outcome: Green city masterplan plan and policies adopted covering the whole city to enable effective management of development to protect communities and maintain and enhance green-blue infrastructure and the associated benefits to the community.

Proposal: City wide green –blue infrastructure masterplan and policies developed in parallel with the City Development Plan and updated Masterplan to acknowledge and reflect the specific climate risks and green blue infrastructure needed to protect the city and its residents.

Issues addressed:

- Mechanism for formal adoption and budgetry
- Limited basis for urban growth management with inadequate control of undeveloped land linked to encroachment on green blue infrastructure and agricultural land. Increased resilience and ecosystem benefits available to the city and its residents as a result.
- High proportion of existing city residents are exposed and vulnerable to climate risk and are not provided with adequate infrastructure. No policy framework to safeguard environmental risk and natural hazard areas areas from development. No policies to protect or provide for natural habitat, biodiversity and urban greenspace. Number of residents living in areas at risk to climate and natural hazards is reduced. Quality of life is enhanced by improved access to urban greenspace and natural habitat.
- Avoid lock in to unsustainable patterns and avoid replicating damage to green-blue infrastructure systems leading to a reducing multidimensional poverty through increased access to services and improved housing compared with the current trend.
- Enables management and stewardship of undeveloped land and delivery of new development areas.

KEY ACTIONS:

City wide blue green infrastructure plan including:

- Policies on channel and tank protection
- Identification of zoned areas/ overlays for flood protection areas and supporting policies.
- Identification and zoning of natural habitat areas and establishment of management norms.
- City greenspace plan with design and management standards.
- Policy, planning standards and design code developed and applied in masterplans for new communities.
- Land management policies

Project 14: Platform for community participation to develop and deliver city plans

RATIONALE:

Outcome: Action Groups linking to City Co-ordinating Group (CCG) and City Voluntary Technical Corps (CVTC) are used as an advisory platform linking with wider City Partnership identified in Project 12.

Proposal: Create Action Groups:

Issues addressed:

- Lack of understanding of role, rights and responsibilities of urban local bodies and people to ensure the ownership, contribution and management of City development process.
- Facilitation of community building processes and initiatives at grassroots level through continuous interaction with city corporation.
- Voice citizen concerns and to take responsibility for constructive actions by the corporations.
- Ensure equity and fairness in the implementation of infrastructure programmes and resource allocation based on the needs and viability.
- Social audit of development and infrastructure programmes which will become a monitoring tool of the society.
- Technical support in governance, planning, finance, poverty and heritage.

KEY ACTIONS:

- Establishment and enablement of agreed City Partnership co-ordination structures.
- Identify anchor NGO to act as secretariat
- Workplan for the Action Groups prepared including community outreach and engagement activities.

Indicative Budget Plan Estimated cost \$195.8m – 764.1m+

| Project | Part | Description | Cost range |
|---|------|---|---|
| Project 1: Sewer System Rehabilitation | A | Mapping of sewer system | up to \$1million |
| | B | Completion of the sewerage infrastructure | \$100 million |
| | C | Community up to \$1m | |
| Project 2: Sanitation community capacity building | A | Community capacity building | up to \$1million |
| Project 3: Improved Solid Waste Infrastructure | A | Introduce PPP approach for both primary and secondary waste collection | Up to \$500k |
| | B | Development of Anaerobic Digestion facility for managing organic waste | \$5-10m |
| | C | Developing basic recycling infrastructure | Up to \$1m |
| Project 4: Improved Solid Waste Management | A | Waste data collection | up to \$250,000 |
| | B | Community awareness and education | up to \$100,000 (annually) |
| | C | Formalising the Informal | up to \$100,000 (annually) |
| | D | Integrated waste management plan | up to \$500,000 initial set up and development Ongoing internal annual costs |
| Project 5: Channel and tank restoration | A | Further mapping of channel and tank system, and improved understanding of interactions and operations | \$5 million |
| | B | Restoration of channels and tanks, especially south of the River Vaigal. To address potential climate impacts | \$10-\$100 million |

| Project | Part | Description | Cost range |
|--|------|---|-------------------|
| Project 6: Channel and tank protection | A | Establishment or refinement of operational rules | \$1-\$10 million |
| | B | Abstraction management | \$1-\$10 million |
| | C | Discharge regulation and management, to prevent discharge of sewerage and industrial effluent into channels and tanks | \$1-\$10 million |
| | D | Encroachment management | \$1-\$10 million |
| Project 7: Channel and tank community involvement | A | Channel and tank community involvement | up to \$250,000 |
| Project 8: Flood and surface water infras improvements | A | Separation of sewers and storm drains | \$1-\$10 million |
| | B | Construction of adequate surface drainage | \$10-\$50 million |
| | C | Flood storage | \$10-\$50 million |
| | D | Flood defences | \$10-\$50 million |
| | E | Green infrastructure improvements: areas | \$10-\$50 million |
| Project 9: Flood and surface water capacity building | A | Rural soil erosion management | up to \$1million |
| | B | Flood risk awareness | up to \$500,000 |

| | | | |
|---|-----|---|--|
| Project 10: Water resources infra improvements | A | Study to examine the feasibility of reusing waste water | up to \$1 million |
| | B | Provision of local water treatment facilities | \$10-\$100 million |
| | C | Mains replacement | \$10-\$100 million and over |
| | D | Pressure management | \$1-\$10 million |
| | E | Metering | \$10-\$100 million and over |
| Project 11: Water resources capacity building | A | Water Safety Plan. Development of a Water | \$1-\$15 million |
| | B | Rain water harvesting. This is mandatory | up to \$10 million |
| | C | Education on water sources and hygiene (linked with sanitation training) | up to \$250,000 |
| Project 12: Green Blue Infrastructure Co-ordination | A+B | Establishment and enablement of agreed City Partnership co-ordination structures | \$250,000-\$500,000 (excluding staff resourcing costs) |
| | C | Infrastructure standards and co-ordination procedures to enable effective infrastructure delivery | \$250,000-\$500,000 |

| Project | Part | Description | Cost range |
|--|------|---|------------------------|
| Project 13: Green City Plan Linking to the City Development Plan and Masterplan | A | Policies on channel and tank protection | \$250,000 - \$500,000 |
| | B | Identification of zoned areas/overlays for flood protection areas and supporting policies | \$500,000- \$1,000,000 |
| | C | Identification and zoning of natural habitat areas and establishment of management norms | \$250,000 - \$500,000 |
| | D | City greenspace plan with design and management standards | \$250,000 - \$500,000 |
| Project 14: Platform for community participation to develop and deliver city plans | A | Establishment and enablement of agreed community participation platform | \$100,000 |

Outcomes

Action Planning Approach used to develop a shared vision and programme for the city

Integrated approach maximising poverty reduction and reducing climate risks

Programme of projects identified with approach to funding.

Projects led by State, City and civil society bodies.

City and State level buy in



Difference a future proofing approach has made: Key lessons



01

Future Proofing

is a helpful process in supporting partners to define shared priorities and goals



02

Success

is dependent on establishing an open and inclusive process



05

Using local actors and language is important to create **active dialogue**



03

Taking a patient approach is needed to maximise the **impact of engagement**



04

Using action planning to **explore issues and challenges** from different angles using a global and local lens



06

Using **Vision to inspire**



07

Addressing the gap between holistic thinking and integrated action



08

Using evidence to convince and **mobilise change**



09

Focussing at the city scale is important to gain support for climate change action



10

Approach to developing plans and engaging with institutions and stakeholders should flex to respond to local realities



11

Making the case and **securing local resources** is a key measure of success



12

Institutions at local level do not hold all of the keys for addressing the challenge

